

## MATHEMATICS CONTEST CORNER

### From Guess and Check to Strategic Problem Solving

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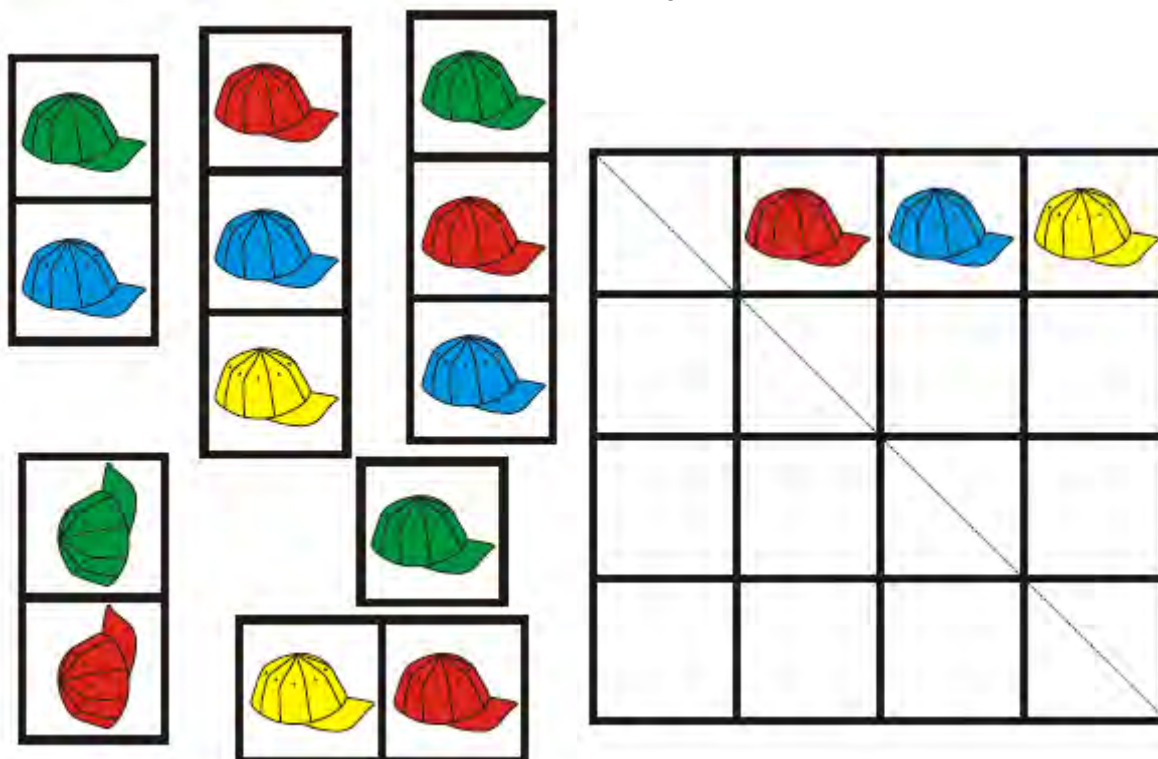
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*According*

to John Van de Walle, “Children ... should come to know mathematics as a discipline involving investigating, verifying, exploring, explaining, discovering, conjecturing, describing and so on.” (2007, p. 1). However, when students are engaged in problem solving and teachers inquire as to the strategy used, the reply is often Guess and Check. Although this is a legitimate strategy, how do we move students beyond Guess and Check to more efficient problem solving strategies?

Let’s consider the 2004 MathCounts Cap Poster Problem given below:



**What color caps are in the bottom row?**

Students are directed to arrange the groups of caps onto the poster at the right. The caps cannot be rotated, must maintain cap orientation, and display color line symmetry. At first this might appear to be a simple task. However as the students realize the groups must remain intact, the task becomes a more difficult one. Some students will find the solution, after a great deal of trial and error. However this problem offers great mathematical reasoning opportunities, the question is how do we assist students in using mathematical reasoning rather than simply trial and error?

John Van de Walle, 2007, asserts the most significant factor in student's learning is reflective thought. He suggests the best way to cause reflective thinking in the area of mathematics is through the use of problem-based tasks that require students to struggle with ideas using the mental tools they possess. Teachers act as facilitators asking questions to activate student's previous knowledge, allowing them to reflect upon the mathematical strategies they are familiar with which might apply to the given situation.

A recent group of graduate students was given this problem. As suspected all of the students began with trial and error. After several minutes of inquiry, it was suggested that the students examine the poster again, and look for given information. With this single suggestion, students were redirected to reflect on the problem, decide upon given information and devise a plan to solve the problem.

As the students completed the task, they were asked to reflect on the problem and record how they arrived at the solution. What strategies did they use? Which strategy was effective, and why? Which strategy was least effective, and why? Is there more than one solution? Once all students had completed the task, the class discussed the above mentioned questions. The conclusion was that guess and check may have eventually worked, but it seemed to distract the students from realizing the given relevant data.

As the students began to reexamine this problem, their prior knowledge of line symmetry allowed them to realize a yellow hat was needed in the bottom right hand corner of the poster. Only two pieces met this requirement. From here the students' processes began to differ, but led to a single solution.

Although this problem does not present a labeled problem solving strategy, it does present an important strategy of identifying the given information, before jumping into the solution. When important or significant strategies crop up, they should identified, highlighted and discussed, (Van de Walle, 2007, p. 57). This discussion is imperative for students to progress from guess and check to strategic problem solving strategies. Labeling strategies provides a means for students to discuss their methods and by continually exposing students to problem-based learning, students develop a repertoire of problem solving strategies.

## References

- MathCounts Foundation, (2004). *Caps Poster Problem*. Retrieved on February 12, 2008, at <http://mathcounts.org/NETCOMMUNITY/Page.aspx?pid=1255&srcid=333>.
- Van de Walle, J. (2007). *Elementary and Middle School Mathematics: Teaching Developmentally*, 6. Boston, MA: Pearson Education, Inc.
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